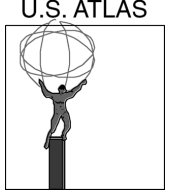


WBS 1.6 Trigger DAQ Subsystem

Robert Blair

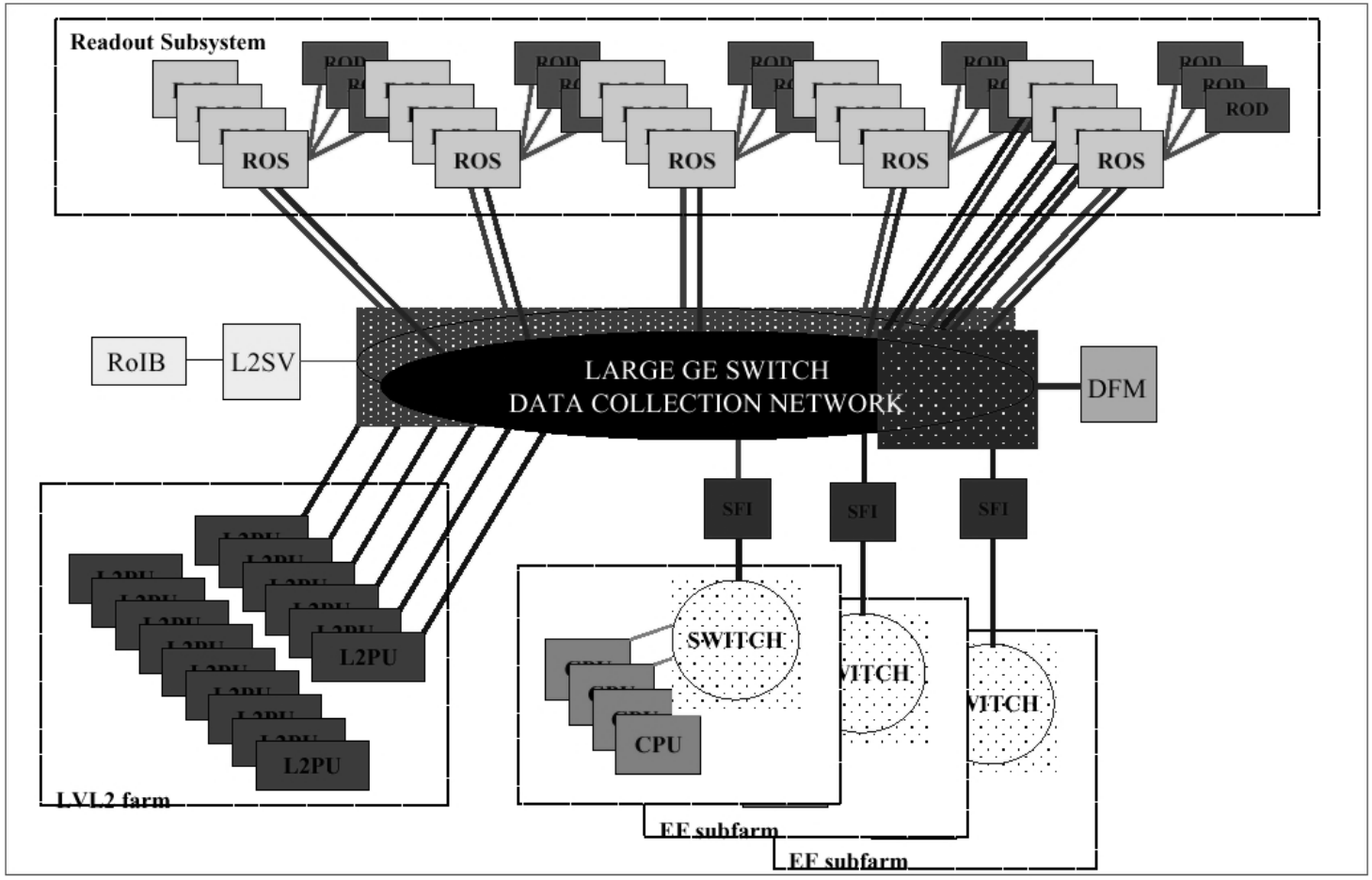
Argonne National Lab

Outline

- Organizational Changes
- Technical Status
- Cost and Schedule Status (as of 12/01)
- ETC02 Cost and Schedule Changes
  - Schedule Changes
  - Cost Changes
- Baselining Plans
- Conclusions

System Overview

An Example HLT/DAQ Implementation with Separate LVL2 and EF Networks



WBS 1.6 Responsibilities

- **WBS 1.6 Trigger/DAQ System**
  - **U.S. TDAQ responsibilities have remained unchanged.**

1.6.1 LVL2 Supervisor & RoI Builder (100%)

ANL + MSU Level 3 manager: R. Blair (ANL)

1.6.2 LVL2 Calorimeter Trigger (50%)

ANL + MSU (with Mannheim)

Level 3 manager: M. Abolins (MSU)

1.6.3 LVL2 SCT Trigger (50%)

UCI + Wisconsin (with London RHBNC, London UCL, RAL)

Level 3 manager: A. Lankford (UCI)

1.6.4 Architectural Design & LVL2 Global Trigger

ANL + MSU (with CERN, Genova, Lecce, Rome, Liverpool, Manchester, RAL)

Level 3 manager: R. Blair (ANL)

1.6.5 T/DAQ Common Projects

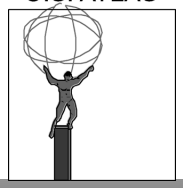
UCI + MSU Level 3 manager: A. Lankford (UCI)

Organizational Changes

- **No US Atlas Changes**
- **Overall Atlas will change project leader in late ’02**
- **Trigger DAQ (TDAQ) composed of**
  - **Supervisor RoI Builder (SRB)**
  - **Level 2 Processors and network**
  - **Readout system (ROS)**
  - **Event Filter and network (EF)**
- **U.S. deliverables are about 32% of total Level 2**
- **U.S. deliverables are about 0% of total ROS**
- **U.S. deliverables are about 0% of total EF**
- **U.S. Institutions**
  - **Argonne National Lab.**
  - **Michigan State University**
  - **University of California Irvine**
  - **Wisconsin**

Cost and Schedule Status (as of 12/01)

- **End ’02 complete Technical Design Report**
  - **Software design and implementation for core system complete – testing and algorithm integration remains**
  - **Review of design in TDAQ workshop at CERN in 7/02**
- **Preliminary Design Review of RoI Builder 2/02**
  - **Early input from reviewers before too much is beyond revision**
  - **Follow up by review team (April & July)**
  - **Prototype production by August to allow for some “exploitation” prior to TDR**
  - **Schedule has slipped**
    - **To allow for thorough review**
    - **Mostly to better align with Level 1 readiness (early ’03)**
- **Performance tests and modeling**
  - **First pass by July workshop**
  - **Final pass by Nov.**

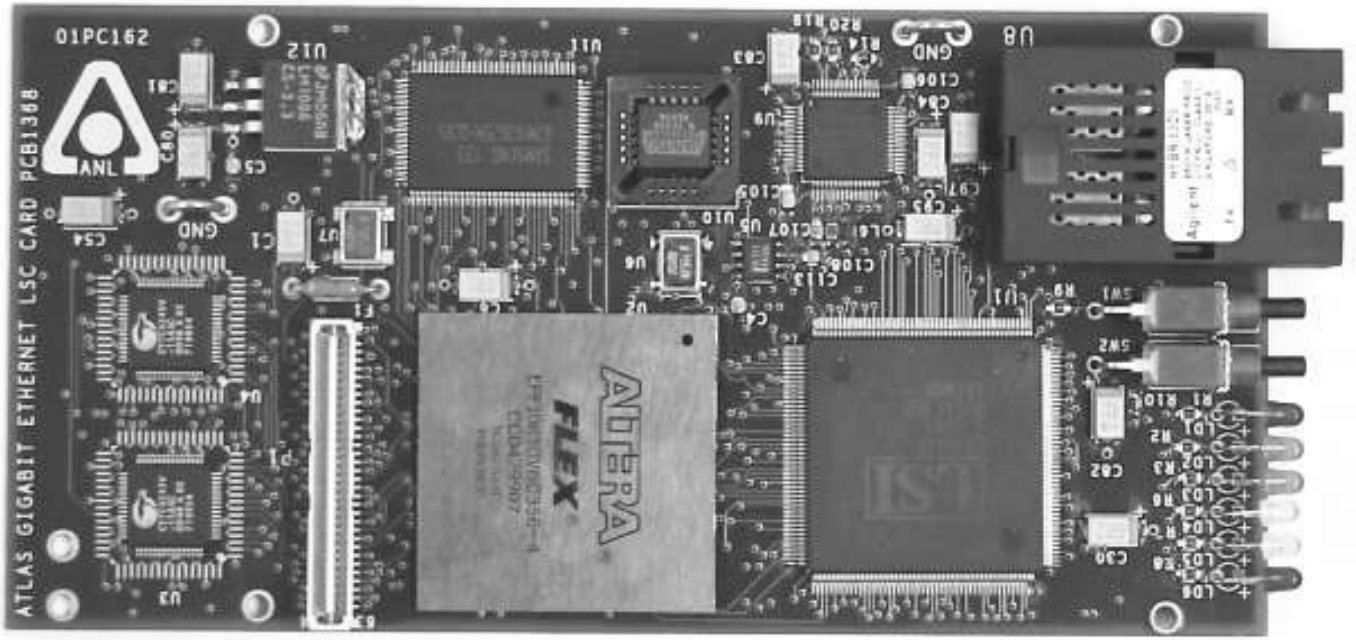


Technical Status

- **Initial software design and integration complete for Datacollection**
  - **Algorithms not integrated**
  - **Measurements and performance tuning still to be done**
  - **Detailed analysis (modeling and performance comparisons) is beginning**
- **RoI Builder has had first pass at design review – too many good susggestions**
  - **Current schedule is to have prototype by late summer ‘02**

U.S. ATLAS

Gigabit Ethernet LSC



One component of RoIB – allows use of commodity network cards and switches for routing of data to (and from RoIB). Includes buffering and is being used to evaluate low traffic Readout Buffer (ROB on ROD).

U.S. ATLAS

ETC02 Cost Comparison
TDAQ – WBS Level 3

WBS	Description		Resource Category	FY01 Budgeted	FY01 Actuals	ETC 01 Total Budget (FYs01-05)	FY02 revised	FY03 revised	ETC 02 Total
1.6	**Trigger/DAQ**		**Total**	665.0	470.9	1,897.9	819.0	622.4	1,912.30
			Total Mat'l	213.6	31.7	438.9	214.2	216.3	462.25
			Total Labor	451.4	439.2	1,459.0	604.8	406.1	1,450.05
1.6.1	**LVL2 SRB**		**Total**	246.5	340.2	678.2	320.2	183.3	843.73
1.6.2	**LVL2 Calorimeter Trg**		**Total**	150.7	4.1	416.2	176.5	140.1	320.70
1.6.3	**LVL2 SCT Trg**		**Total**	267.8	125.7	803.5	322.3	299.0	746.97
1.6.4	**Architecture**		**Total**	-	0.90	-	-	-	0.90

Explanation of Significant Cost Changes

1.6.1 Small increase in cost due to schedule delay

1.6.2 & 1.6.3 Material spending pushed back, but may not be required (previously deployed systems may be adequate)

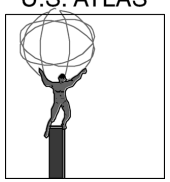
U.S. ATLAS

Installation

- ***Narrow*** **Definition of Scope: Support for the act of installing a U.S. deliverable into the ATLAS Experiment**
- **TDAQ installation**
  - **Fabrication, checkout & delivery of RoIB**
  - **Purchase, checkout & delivery of Supervisor CPUs+network**
  - **Purchase, checkout & delivery of LVL2 networking**
  - **Purchase, checkout & delivery of LVL2 CPU's**
  - **Software**
- **Profile of labor requirements: FTEs/year**
- **Profile of total costs**

Conclusions

- **Current target review (July ’02) and final design (Dec. ’02) will be met**
- **Slippage on RoIB primarily to happened to better match LVL1 schedule**
- **Research program nearing its end**
  - **US baseline should be developed Q1 FY03**
    - **Would like to define US commitments so that FY05 is a real project end date**
      - **Realistic for RoIB since it is hardware and early and no significant cost savings occur through delay**
      - **Other infrastructure items may fit here (network) but this requires negotiation among LVL2 institutes**
      - **Scale may not match well with assumed US contribution since networking + SRB may be smaller than initial expected US share**
      - **Baselining gets coupled and constrained by this and may be complicated and prolonged as a result (no longer 30% of X)**



TDAQ Maintenance and Operations; Upgrade R&D

Robert Blair

Argonne National Lab.

Outline

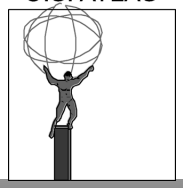
- **Needs to be supported by pre-operations, commissioning, M&O**
  - **Pre-operations**
    - **Testbeam**
    - **Network & CPU farm administration + maint.**
  - **Commissioning & M&O**
    - **Rollover of farms and network**
    - **Administration and maintenance**
    - **Software updates**
- **Impact of receiving NO support in:**
  - **FY03**
    - **TDAQ testbeam support no longer has TDAQ R&D program to borrow from**
  - **FY04**
    - **Initial infrastructure will not function without M&O**
- **Upgrade R&D plans**
  - **None now, deferrals?**

Level 2 System Cost Sharing from Access

- **Level 2 (Project 1.6.2-4 -> M&O 3.6.3)**
  - **30% US responsibility (ANL , MSU, UCI & UW)**
    - **Consists of farm type processors (~1000)**
    - **Network interfaces**
    - **Network switches**
    - **Software**
- **Primary M&O responsibilities**
  - **Spares**
  - **Software support (upgrades and bug fixes)**
    - **Constant effort at level of 1.5 Computer Prof. and 4 Postdocs**
  - **Rolling replacement (CPU's on a 4 year cycle Network on 10-13 year cycle)**
    - **Contributes to above**
- **Most of this appears under Common Costs**
  - **Atlas wide decision to consider this as Class A M&O**
  - **US gets a discount and contributes according to core fraction 17%**

Labor Summary FTEs by FY

- **LVL2 Software (Project 1.6.1-5 -> M&O 3.6.2…)**
  - **Software/hardware reliability requires continuous upgrade cycle**
  - **Labor not included in ATLAS common costs (except for farm management)**
- **Primary M&O responsibilities**
  - **TDAQ support for testbeams comes from research program?**
  - **TDAQ software revisions, bug fixes and improvement**
  - **Network engineering for diagnosis and resolution of network related problems**



Common Costs

- **ATLAS Common Costs Include**
  - **4 year rollover of computing systems**
  - **10-13 year rollover of network**
  - **Video and phone costs for support**
  - **Lab for evaluation and repair of TDAQ electronics**
  - **5% per year replacement rate on electronics (other than CPU's and network)**

U.S. ATLAS

Total Manpower

MANPOWER ESTIMATE SUMMARY IN FTEs

WBSNo: 3.6 | Funding Type: Project | 10/17/01 5:28:20 PM

Description: Tigger/DAQ | Institutions: All | Funding Source : All

	FY03	*FY04*	*FY05*	*FY06*	*FY07*	*FY08*	*FY09*	*FY10*	*FY11*	*FY12*	*Calcu-lated Total*	*Entered*
Faculty											.0	.5
Sr Research											.0	.0
Term Scientist											.0	.0
Post Doc					.5	.5	.5	.5	.5	.5	3.5	.0
Grad Student											.0	.0
Mechanical Engineer											.0	.0
Electrical Engineer			.1	.1	.5	.5	.5	.5	.5	.5	3.7	.0
Technicial											.0	.0
Computer			.1	.1	2.0	2.0	2.0	2.0	2.0	2.0	14.2	.0
Designer											.0	.0
Adminsitrator											.0	.0
Contract Labor											.0	.0
TOTAL LABOR	.0	.2	.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	21.5	.5

Profile

U.S. ATLAS MO Estimate
WBS Profile Estimates

Funding Source: All Funding Type: Project 10/25/01 10:41:25 AM

Institutions: All

WBS Number	Description	FY 03 (k$)	FY 04 (k$)	FY 05 (k$)	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)	Total (k$)
3.6	Tigger/DAQ	0	89	342	773	877	877	877	877	877	877	6466
3.6.1	Pre Operations	0	0	23	14	0	0	0	0	0	0	36
3.6.1.1		0	0	0	0	0	0	0	0	0	0	0
3.6.1.2	Communications and Travel	0	0	14	14	0	0	0	0	0	0	27
3.6.1.2.1	Communications and Travel	0	0	7	7	0	0	0	0	0	0	13
3.6.1.2.2	Communications and travel	0	0	7	7	0	0	0	0	0	0	14
3.6.1.3	Programming Support	0	0	9	0	0	0	0	0	0	0	9
3.6.1.3.1	Programming Support	0	0	5	0	0	0	0	0	0	0	5
3.6.1.3.2	Programming Support	0	0	4	0	0	0	0	0	0	0	4
3.6.2	Operations	0	36	61	367	377	377	377	377	377	377	2725
3.6.2.1	Supervisor RoI Builder	0	36	40	145	145	145	145	145	145	145	1091
3.6.2.1.1	Supervisor RoI Builder	0	16	20	69	69	69	69	69	69	69	522
3.6.2.1.2	Supervisor RoI Builder	0	20	20	76	76	76	76	76	76	76	569
3.6.2.2	Communications and Travel	0	0	0	0	10	10	10	10	10	10	61
3.6.2.2.1	Communications and Travel	0	0	0	0	5	5	5	5	5	5	30

Page 1 of 2

Profile

WBS Number	Description	FY 03 (k$)	FY 04 (k$)	FY 05 (k$)	FY 06 (k$)	FY 07 (k$)	FY 08 (k$)	FY 09 (k$)	FY 10 (k$)	FY 11 (k$)	FY 12 (k$)	Total (k$)
3.6.2.2.2	Communications and Travel	0	0	0	0	5	5	5	5	5	5	30
3.6.2.3	Programming Support	0	0	0	201	201	201	201	201	201	201	1404
3.6.2.3.1	Programming Support	0	0	0	65	65	65	65	65	65	65	455
3.6.2.3.2	Programming Support	0	0	0	51	51	51	51	51	51	51	358
3.6.2.3.3	Programming Support	0	0	0	75	75	75	75	75	75	75	524
3.6.2.3.4	programming Support	0	0	0	10	10	10	10	10	10	10	67
3.6.2.4	Test facilities	0	0	21	21	21	21	21	21	21	21	169
3.6.2.4.1	Test Facilities	0	0	10	10	10	10	10	10	10	10	79
3.6.2.4.2	Test Facilities	0	0	11	11	11	11	11	11	11	11	91
3.6.3	CERN Common Costs	0	53	258	392	500	500	500	500	500	500	3705

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Conclusions

- **Most of costs are simply part of overall Atlas M&O**
- **No consideration in these numbers of *research related* activity (strictly amounts that can be described as necessary to continue operation of the TDAQ system)**